

The Pliocene Research, Interpretation and Synoptic Mapping (PRISM) paleoenvironmental reconstruction is an internally consistent and comprehensive global synthesis of a past interval of relatively warm and stable climate. It is regularly used in model studies that aim to better understand Pliocene climate, to improve model performance in future climate scenarios, and to distinguish model-dependent climate effects. The PRISM reconstruction is constantly evolving in order to incorporate additional geographic sites and environmental parameters, and is continuously refined by independent research findings. The new PRISM three dimensional (3D) reconstruction differs from previous PRISM reconstructions in that it includes a subsurface ocean temperature reconstruction, integrates geochemical sea surface temperature proxies to supplement the faunal-based temperature estimates, and uses numerical models for the first time to augment fossil data. Here we describe the components of PRISM3D and describe new findings specific to the new reconstruction. Highlights of the new PRISM3D reconstruction include removal of Hudson Bay and the Great Lakes and creation of open waterways in locations where the current bedrock elevation is less than 25m above modern sea level, due to the removal of the West Antarctic Ice Sheet and the reduction of the East Antarctic Ice Sheet. The mid-Piacenzian oceans were characterized by a reduced east-west temperature gradient in the equatorial Pacific, but PRISM3D data do not imply permanent El Niño conditions. The reduced equator-to-pole temperature gradient that characterized previous PRISM reconstructions is supported by significant displacement of vegetation belts toward the poles, is extended into the Arctic Ocean, and is confirmed by multiple proxies in PRISM3D. Arctic warmth coupled with increased dryness suggests the formation of warm and salty paleo North Atlantic Deep Water (NADW) and a more vigorous thermohaline circulation system that may have provided the enhanced ocean heat transport necessary to move warm surface water to the Arctic. New deep ocean temperature data also suggests greater warmth and further southward penetration of paleo NADW.